ON THE ANATOMY OF THE CENTRAL NERVOUS SYSTEM OF THE NINE-BANDED ARMADILLO (TATU NOVEMCINCTUM LINN.).[1]

LILY C. SHUDDEMAGEN.

The present paper is a contribution to the macroscopical anatomy of the brain, spinal cord, cranial and spinal nerves of the nine-banded armadillo.

There appears to be no literature on any portion of the central nervous system except the brain in any edentate, with the exception of Pouchet's classic account of *Myrmecophaga;* with this omission the relations of the spinal cord in this group are unknown, and the present description of that organ complex is an attempt to fill this hiatus in our knowledge. A list of the memoirs treating of the anatomy of the brain is appended at the end of the present paper; of those memoirs, the ones by Gervais (1869), Pouchet (1869), and notably Smith (1899) are the most important. Smith is the only writer who mentions the brain of the particular species examined by me, but gives no figures of it; and indeed, our knowledge of the general anatomy of this species is much more scant than of various other armadillos,— even the rare *Chlamydophorus.*

Comparisons of the brain of this species are made with the brains of other described Dasypodidæ, and I have followed Smith's nomenclature of the parts.

The material used consisted of four specimens, two males and two females, procured in the neighborhood of Austin, Travis County, Texas. Two of these were preserved in formalin and two in alcohol.

This work has been done entirely under the direction of Prof. Thos. H. Montgomery, Jr., and the writer is under great obligation to him for his helpful suggestions, and kindly sympathy and constant encouragement during the preparation of this memoir.

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1. The Brain.

General Topography.

The brain is almost twice as long as broad. The bulbus olfactorius forms the most anterior, and the medulla oblongata its most posterior parts. The cerebrum broadens out posteriorly, and, on lateral view, is not quite as high as the cerebellum. The general shape is much like that of the lower mammals.

(*a*) *Prosencephalon.* — The prosencephalon is composed of the following parts : bulbus olfactorius, tuberculum olfactorium, lobus pyriformis, pedunculus olfactorius, locus perforatus, and the cerebral hemispheres.

The *bulbus olfactorius* (Pl. XXIV., Fig. 1, *Bul. Olf.*) is the most anterior part of the brain, and is relatively enormous. From a ventral view, it is seen to be heartshaped with the apex pointing forward. The ventral surface is indented by almost parallel furrows or sulci, running at right angles to the long axis of the brain. The dorsal surface (Fig. 4) is spherically rounded and smooth. It is placed somewhat ventral to the cerebral hemispheres (Fig. 2), so that over half of its dorsal surface is overlapped by them. From the anterior part of the bulbus olfactorius the olfactory nerve spreads out in a great fan-shaped mass.

The *tuberculum olfactorium* (Pl. XXIV., Fig. 1, *Tub. Olf.*) is a large oval area slightly raised above the surrounding regions. It is separated from the bulbus olfactorius by the pedunculus olfactorius. Its surface is not smooth, but somewhat tuberculated. It reaches a relatively large size in the armadillo.

The *lobus pyriformis* is visible along the lateral surface of the brain, just posterior to the tuberculum olfactorium ; it consists of an anterior lobe (*Lob. Pyr. A.*, Fig. 2), and a posterior (*Lob. Pyr. P.*, Fig. 1).

The *pedunculus olfactorius* (Pl. XXIV., Fig. 3, *Ped. Olf.*) is to be seen only in a lateral view of the brain. It connects the bulbus olfactorius with the remainder of that organ. In both dorsal (Pl. XXIV., Fig. 4), and ventral (Fig. 1), views it is hidden by the cerebral hemispheres and the oblique position of the bulbus olfactorius.

The *locus perforatus* (Pl. XXIV., Fig. 1, *Loc. Perf.*) is the

depressed, quadrilateral area immediately anterior to the optic chiasma.

The *cerebral hemispheres* (Pl. XXIV., Figs. 2 and 4) show as high a development as any of the armadillos figured by Smith. The short *anterior rhinal fissure* (Pl. XXIV., Fig. 4, *Fis. Rh. A.*) begins in the boundary between the bulbus olfactorius and the hemispheres. It extends obliquely upwards for about a fourth of the length of the hemispheres. The *posterior rhinal fissure* (Pl. XXIV., Fig. 4, *Fis. Rh. P.*) begins near the posterior border of the hemispheres and runs horizontally towards the anterior part of the hemispheres, where it joins the sulcus β (Pl. XXIV., Fig. 4, β). In the most dorsal part of the hemispheres, the sulci γ and δ (Pl. XXIV., Fig. 4) are faintly developed. The latter of these two sulci corresponds to the suprasylvian sulcus of other mammals. On the mesial surface of the two hemispheres the sulcus limitans pallii (Pl. XXIV., Fig. 3, *Sul. L.*) is found.

In this animal, as in all mammals, a series of nerve fibers, or *commissures*, serve to connect homologous areas of the two hemispheres.

The most dorsally placed commissure is in the form of an inverted, obliquely placed U (Pl. XXIV., Fig. 3, *Cor. Cal.*). The arms of the U are formed by the corpus callosum (Pl. XXIV., Fig. 3, *Cor. Cal.*), and the ventral and dorsal psalterium (Pl. XXIV., Fig. 3, *Psal. V.* and *D.*). The curve of the U is formed by the splenium (Pl. XXIV., Fig. 3, *Spl.*). This commissure is placed more nearly vertical, and is rather smaller than in most of the edentate brains figured by Smith. There is really no apparent distinction between the dorsal and ventral psalterium. The psalterium is slightly longer than the corpus callosum. The two arms of this dorsal commissure are in contact with each other for the greater part of their extent, only the most ventral part of the psalterium extends a little further ventrally than the corpus callosum. The interval between the two arms of the dorsal commissure is called the septum lucidum in human anatomy. In the edentates, Smith calls this the paracommissural body. But since the two arms of the commissure are in contact with each other for the greater part of their extent, there is practically no septum lucidum or paracommissural body, in this armadillo.

The *anterior commissure* (Pl. XXIV., Fig. 3, *Com. A.*) is of fairly large size. It is a rather cylindrical bundle of fibers and connects the pyriform lobes. Because of the relatively large size of the pyriform lobes, the anterior commissure attains its increase of size. In the armadillos, all the parts of the brain connected with the sense of smell, reach relatively large dimensions.

(*b*) *Thalamencephalon.* — The thalamencephalon is the second embryological division of the brain, and consists of that part which bears the optic thalami, the infundibulum, pituitary body, and pineal body.

The *optic thalami* (Pl. XXV., Fig. 7, *Opt. Th.*) and the corpora quadrigemina (Pl. XXV., Fig. 7, *Cor. Q.*) form a large area of quadrilateral shape. The optic thalami are separated from each other, in the median line, by the third ventricle. They are connected across this ventricle by means of the commissura molli. This extends across the slit-like third ventricle as a large cylindrical mass of fibers (Pl. XXIV., Fig. 3, *Com. Mol.*). Thus the third ventricle becomes reduced to a narrow circular channel surrounding the commissura molli.

The floor of the third ventricle is drawn downward into a funnel-shaped pouch, the *infundibulum* (Pl. XXIV., Fig. 3, *Inf.*).

The *hypophysis* (Pl. XXIV., Fig. 3, *Hyp.*) is attached to the ventral part of the infundibulum.

The *pineal body* (Pl. XXV., Fig. 7, *Cor. Pin.*) lies in a shallow groove of the anterior corpora quadrigemina, just posterior to the third ventricle.

The *third ventricle* (Pl. XXV., Fig. 7, *Ven. III*) opens into the two first ventricles (Pl. XXV., Fig. 7, *Ven. I*) by means of the foramen of Monroe (Pl. XXV., Fig. 7, *For. M.*). Out of the posterior part of the third ventricle, the aqueduct of Sylvius (Pl. XXIV., Fig. 3, *Aq. Syl.*) opens and passes into the fourth ventricle.

The *II, or optic nerve* (Pl. XXIV., Fig. 1, *II*) comes off from the ventral surface of the brain, just a little anterior to the infundibulum. It is of very small size, because of the great diminution of the visual acuteness and consequent reduction of the size of the eye.

The *IV, or pathetic nerve* (Pl. XXIV., Fig. 1, *IV*) arises from

the ventral surface of the brain, just posterior to the infundibulum.

(*c*) *Mesencephalon.* — The mesencephalon is that embryological division of the brain which gives rise to the corpora quadrigemina and the crura cerebri.

The *corpora qnadrigemina* (Pl. XXV., Fig. 7, *Cor. Q.*) lie immediately posterior to the optic thalami. The anterior pair of the corpora quadrigemina forms an area slightly elevated above the level of the optic thalami. Just posterior to them, the posterior pair of the corpora quadrigemina rise to a much higher level (Pl. XXIV., Fig. 3, *Cor. Q.*); their most dorsal point comes up almost to the level of the cerebral hemispheres. The corpora quadrigemina are wedged between the cerebellum and the cerebral hemispheres. In the armadillo, they are not separated across the middle, but form one body in which separation is only faintly indicated by a shallow longitudinal furrow. The reduction in the size of the anterior pair of the corpora quadrigemina is probably due to the waning importance of the sense of sight. The posterior corpora quadrigemina retain their large size, or perhaps even show an increase in size, because they are not connected as directly with the sense of sight.

The *crus cerebri* arises from under the optic tract as a faint, indistinct band of fibers, runs backwards and disappears under the pons Varolii.

(*d*) *Metencephalon.* — The embryological division of metencephalon gives rise, in the adult, to the cerebellum.

Viewed dorsally (Pl. XXIV., Fig. 4), the cerebellum presents a somewhat triangular shape, where the paraflocculi (Pl. XXIV., Fig. 4, *Par. Fl.*) and the posterior lobe (Pl. XXIV., Fig. 4, *Lob. P.*) form the three angles. The cerebellum is much convoluted, as is the case in all mammals. Its greatest diameter is transverse. This large cerebellar mass hides from view the entire fourth ventricle except the most posterior part (Pl. XXIV., Fig. 4, *Ven. IV*). The cerebellum is supported and connected with the brain stem by two cerebellar peduncles (Pl. XXV., Fig. 7, *Ped. Cer.*). Anteriorly, the cerebellum is closely adapted to the contour of the cerebral hemispheres. It projects forward sufficiently to hide the posterior corpora quadrigemina completely.

The most lateral projections of the cerebellum are two fairly large sized bodies. These bodies, composed of a number of folia and separated almost entirely from the remainder of the cerebellum by a fissure, are the *lobi flocculi.*

Each of these *lobi flocculi* consists of two distinct parts, the flocculus (Pl. XXIV., Figs. 1 and 2, *Floc.*) and the paraflocculus (Pl. XXIV., Figs. 2 and 4, *Par. Fl.*). The latter is much the largest of the two, and almost completely hides the former from view. From a dorsal view the paraflocculus (Pl. XXIV., Fig. 4, *Par. Fl.*) appears as a crescentic mass of folia, forming the lateral projections of the cerebellum.

Aside from the *lobi flocculi,* the remainder of the cerebellum may be divided into three lobes, the lobus anticus (Pl. XXIV., Fig. 4, *Lob. A.*), the lobus centralis (Pl. XXIV., Fig. 4, *Lob. C.*), and the lobus posticus (Pl. XXIV., Fig. 4, *Lob. P.*).

The *lobus anticus* (Pl. XXIV., Figs. 2, 3, and 4, *Lob. A.*) is separated from the posterior part of the cerebellum by the fissura prima (Pl. XXIV., Figs. 2, 3, and 4, *Fis. 1*). It is clearly visible in a dorsal view of the brain (Pl. XXIV., Fig. 4, *Lob. A.*), and is not hidden between the lobus centralis and the cerebral hemispheres, as is the case in the *Chlamydophorus* (Smith, 1899, Fig. 34) or in *Xenurus* (Smith).

The *lobus centralis* (Pl. XXIV., Figs. 2, 3 and 4, *Lob. C.*) is separated from the lobus posticus by means of the fissura secunda (Pl. XXIV., Figs. 2, 3 and 4, *Fis. 2*). It constitutes the largest and most complex part of the cerebellum. It is a large irregular area which has bulged forward and laterally, wedging its way between the lobus anticus and the lobus flocculus.

The *lobus posticus* (Pl. XXIV., Figs. 2, 3 and 4, *Lob. P.*) is the most caudal part of the cerebellum. It is small, consisting of but few folia, and covers over almost completely the posterior part of the fourth ventricle.

(*e*) *Myelencephalon.* — The embryonic division of myelencephalon gives rise, in tne adult, to the medulla oblongata and the pons Varolii.

The *medulla oblongata* (Pl. XXIV., Fig. 4, *Med. Obl.*) is the most posterior part of the brain, and is continued directly into the spinal cord. In the medulla oblongata is the fourth ventricle,

roofed over by a thin membrane. The greatest part of the medulla oblongata is covered over by the cerebellum.

The *pons Varolii* (Pl. XXIV., Fig. 3, *Pons*) forms the most anterior part of the hind brain. It is a pair of slight elevations on the ventral surface of the brain, a little posterior to the infundibulum.

From the medulla oblongata arise all the remainder of the cranial nerves, from the V to the XII inclusive.

The *V, or trigeminal nerve* (Pl. XXIV., Fig. 1, *V*) arises from the pons Varolii. It soon divides into two branches, the most lateral of which subdivides again.

The *VI, or abducent nerve* (Pl. XXIV., Fig. 1, *VI*) arises in the region of the pons Varolii, and runs to the external rectus eye muscle.

The *VII, or facial nerve* (Pl. XXIV., Fig. 1, *VII*) arises in close connection with the VIII nerve, in the region just laterad of the pons Varolii. It soon subdivides into branches.

The *VIII, or auditory nerve* (Pl. XXIV., Fig. 1, *VIII*) arises with the VII nerve from the same part of the brain. It runs directly outwards and enters the cochlea of the ear.

The *IX, or glosso-pharyngeal nerve* (Pl. XXIV., Fig. 1, *IX*) arises by several roots, from the ventral surface of the medulla.

The *X, or pneumogastric nerve* (Pl. XXIV., Fig. 1, *X*) arises by several roots from the medulla, just posterior to the IX nerve.

The *XI, or spinal accessory nerve* (Pl. XXIV., Fig. 1, *XI*) arises by several roots from the ventral surface of the medulla and the spinal cord. Some of its roots arise from the spinal cord, as far back as the fourth cervical nerve.

The *XII, or hypoglossal nerve* (Pl. XXIV., Fig. 1, *XII*) arises by several roots from the medulla oblongata, just posterior to the origin of the XI nerve.

2. Spinal Cord.

The spinal cord is cylindrical, but somewhat flattened dorso-ventrally. In the cervical and sacral regions, it has a slight enlargement from which the nerves of the brachial and lumbo-sacral plexuses are given off. In the sacral region the cord breaks up into a number of fine nerves which occupy the vertebral canal as the cauda equina. These nerve branches pass out,

pair by pair, from between the caudal vertebræ and supply the muscles of the tail.

The most anterior division of the spinal nerves is the cervical (Pl. XXVI., *C. 1–C. 8*). Of these there are eight pairs.

Of the thoracic nerves (Pl. XXVI., *T. 1–T. 10*) there are ten pairs.

The lumbar region is very short, containing six pairs of nerves (Pl. XXVI., *L. 1–L. 6*).

The sacral nerves (Pl. XXVI., *S. 1–S. 8*) are eight in number.

The exact number of the caudal nerves was not ascertained by me. But they are quite numerous, possibly as many as fifteen to twenty pairs.

(*a*) *Cervical Plexus.* — The cervical plexus (Pl. XXVI., *C. 1–C. 8*) is composed of the dorsal branches of the eight pairs of cervical nerves. These branches pass almost vertically upwards, interlace, and supply the dorsal neck muscles. On Pl. XXVI., on the right hand side of the drawing, are shown the dorsal branches of the cervical nerves.

(*b*) *Brachial Plexus.* — The brachial plexus is composed of the large ventral branches of the third, fourth, fifth, sixth, seventh, and eighth cervical nerves, and the first and second thoracic nerves. The formation of the plexus is due to the union of the several nerves, by means of strong connecting branches. The plexus lies in the axilla, and all the component nerves pass out laterally, almost parallel to the first rib. By means of its branches, the arm and shoulder are innervated.

The three *subscapular nerves*, the cranial (Pl. XXVI., *Sub. Sc. 1*), the middle (Pl. XXVI., *Sub. Sc. 2*), and the caudal (Pl. XXVI., *Sub. Sc. 3*), all supply muscles on the ventral surface of the scapula. The cranial subscapular nerve (Pl. XXVI., *Sub. Sc. 1*) arises from the third, fourth, and fifth cervical nerves. The middle subscapular nerve (Pl. XXVI., *Sub. Sc. 2*) arises from the sixth cervical nerve. The caudal subscapular nerve (Pl. XXVI., *Sub. Sc. 3*) arises from the sixth, seventh, and eighth cervical nerves.

The *suprascapular nerve* (Pl. XXVI., *Sup. Sc.*) arises from the fifth cervical nerve. It passes onto the dorsal side of the scapula and enervates the supraspinatus and infraspinatus muscles.

The *axillary nerve* (Pl. XXVI., *Ax.*) arises from the fifth and sixth cervical nerves. It supplies some muscles in the upper arm.

The *radiales nerve* (Pl. XXVI., *Rad.*) is one of the three nerves that supply the lower arm and hand. It arises from the sixth, seventh, and eighth cervical nerves.

The *medianus nerve* (Pl. XXVI., *Med.*) also principally supplies the muscles of the forearm and hand. It arises from the seventh, and eighth cervical, and the first thoracic nerves.

The *ulnaris nerve* (Pl. XXVI., *Uln.*) is the third lower arm and hand nerve. It arises from the eighth cervical, and first and second thoracic nerves.

(*c*) *Thoracic Plexus.*— From the first, second, and third thoracic nerves arise three ventral branches which pass out laterally and unite into a little separate plexus (Pl. XXVI., *X.*) Then this plexus gives off three main branches which subdivide again and again. All of these branches supply the great lateral skin muscle which is attached along the whole length of the armor. A plexus like this, to my knowledge, is not present in any other mammal. It has probably arisen because of the great development of the large skin muscle, which attaches to the sides of the armor and functions in drawing the animal together in a ball. Because of its origin from the thoracic nerves, I have taken the liberty of naming it the thoracic plexus.

The remainder of the thoracic nerves are arranged similarly to those of other mammals. They divide into two branches almost immediately after leaving the intervertebral foramina. The dorsal branches supply the superficial muscles of the back, while the ventral branches run along the ribs as the intercostal nerves.

(*d*) *Lumbar Nerves.* — The first three lumbar nerves take no part in the formation of the lumbo-sacral plexus. The ventral branch of the first lumbar nerve divides into two branches, the ilio-hypogastric (Pl. XXVI., *Il. Hyp.*), and the ilio-inguinal (Pl. XXVI., *Il. Ing.*). The ventral branch of the second lumbar nerve forms the genito-crural nerve (Pl. XXVI., *Gen. Cr.*). The third lumbar nerve forms the external cutaneous nerve (Pl. XXVI., *Ext. Cut.*).

(*e*) *Lumbo-Sacral Plexus.* — The lumbo-sacral plexus is com-

posed of the fourth, fifth, and sixth lumbar, and the eight sacral nerves. These nerves are all interconnected by strong branches, and they supply the muscles of the thigh and lower limb.

The *anterior crural nerve* (Pl. XXVI., *Ant. Cr.*) is composed of parts of the fourth, fifth, and sixth lumbar nerves. It supplies some of the upper thigh muscles.

The *obturator nerve* (Pl. XXVI., *Obt.*) arises from the sixth lumbar and first sacral nerves. It also goes to supply some of the upper thigh muscles.

The *sciatic major nerve* (Pl. XXVI., *Sc. Maj.*) arises from the sixth lumbar, and first, second, and third sacral nerves. This is the great nerve of the posterior limb. It soon divides into the tibialis (Pl. XXVI., *Tib.*), the perroneus (Pl. XXVI., *Per.*), the gluteous (Pl. XXVI., *Glut.*), and the sciatic minor nerve (Pl. XXVI., *Sc. Min.*).

The *pudendus nerve* (Pl. XXVI., *Pud.*) arises from the fourth sacral nerve.

The *cutaneous femoris nerve* (Pl. XXVI., *Cut.*) arises from the fifth sacral nerve.

General Remarks.

The brain has been previously described for the following Dasypodids :

The brain of *Chlamydophorus truncatus* has been figured and described by Smith (1899) and Pouchet (1869). Hyrtl (1855) gives just a few brief notes on the brain, without any figures.

Dasypus sexcinctus has been figured and described by Smith (1899), Turner (1867), and Pouchet (1869).

Priodon gigas has been figured by Pouchet (1868 and 1869), and mentioned by Smith (1899).

Tolypeutes tricinctus has been mentioned by Smith (1899), and figured and described by Gervais (1869).

Tatu novemcinctum has been mentioned by Smith (1899), without figures.

Tatu peba has been figured and described by Smith (1899) and Rapp (1852).

Xenurus unicinctus has been figured and mentioned by Smith (1899) and Garrod (1878).

Dasypus villosus has been figured and described by Smith (1899).

Smith's (1899) work on the Armadillos is by far the most important, and for this reason I have compared the species under present consideration with his descriptions.

The brain of *Tatu novemcinctum* shows less similarity with the genus *Chlamydophorus*, than with the brain of any other genus of armadillo. To judge by the figure of *Xenurus unicinctus* given by Garrod (1878), there seems to be greater similarity of the brain of *Tatu* with *Xenurus* than with any other genus of armadillo. The fissures, sulci, and the general shape and contour of these two brains have very many points in common. However, much more detailed study must be made of all the species of *Armadillo* before one could venture to assert this with any degree of certainty.

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DESCRIPTION OF THE PLATES.

The following abbreviations have been used:

(Greek letters denote sulci.)

Ant. Cr.	anterior crural.
Aq. Syl.	aqueductus Sylvii.
Ax.	axillary.
Bul. Olf.	bulbus olfactorius.
C. 1–8.	cervical nerves.
Com. A.	commissura anterior.
Com. Mol.	commissura mollis.
Com. P.	commissura posterior.
Cor. Cal.	corpus callosum.
Cor. Pin.	corpus pineale.
Cor. Q.	corpora quadrigemina.
Cut. Fem.	cutaneus femoris posterior.
Ex. Cut.	external cutaneous.
Fis. 1.	fissura prima.
Fis. 2.	fissura secunda.

Fis. Rh. A.	anterior rhinal fissure.
Fis. Rh. P.	posterior rhinal fissure.
Floc.	flocculus.
For. M.	foramen of Monro.
Gen. Cr.	genito-crural.
Glut.	glutæus inferior.
Hipp.	hippocampus.
Hyp.	hypophysis.
Il. Hyp.	ilio-hypogastric.
Il. Ing.	ilio-inguinal.
Inf.	infundibulum.
L. 1–10.	lumbar nerves.
Lob. A.	lobus anticus.
Lob. C.	lobus centralis.
Lob. P.	lobus posticus.
Lob. Pyr. A.	lobus pyriformis anterior.
Lob. Pyr. P.	lobus pyriformis posterior.
Loc. Perf.	locus perforatus.
Med.	medianus.
Med. Obl.	medulla oblongata.
Obt.	obturator.
Opt. Th.	optic thalami.
Par. Fl.	paraflocculus.
Ped. Cer.	pedunculi cerebelli.
Ped. Olf.	pedunculus olfactorius.
Per.	peroneus.
Psal. D.	psalterium dorsale.
Psal. V.	psalterium ventrale.
Pud.	pudendus.
Rad.	radialis.
S. 1–8.	sacral nerves.
Sc. Maj.	major sciatic.
Sc. Min.	minor sciatic.
Spl.	splenium.
Sub. Sc. 1.	cranial subscapularis.
Sub. Sc. 2.	middle subscapularis.
Sub. Sc. 3.	caudal subscapularis.
Sul. L.	sulcus limitans pallii.
Sup. Sc.	suprascapularis.
T. 1–10.	thoracic nerves.
Tib.	tibialis.
Tr. Opt.	tractus opticus.
Tub. Ac. L.	tuberculum acusticum laterale.
Tub. Ac. M.	tuberculum acusticum median.
Tub. Olf.	tuberculum olfactorium.
Uln.	ulnaris.
Ven. I.–IV.	ventricles I.–IV.
I.–XII.	cranial nerves.

Explanation of Plates.

All the figures are from enlarged freehand sketches. The figures on Plates I. and II. were drawn twice natural size, and then reduced about one third in the reproduction. Plate III. was drawn natural size, and then reduced about one half in the reproduction.

Plate XXIV.

Fig. 1. Ventral view of the brain.
Fig. 2. Lateral view.
Fig. 3. Median longitudinal section.
Fig. 4. Dorsal view.
Fig. 5. Ventral view of a late fœtal brain; length of the fœtus was about 15 cm.
Fig. 6. Dorsal view of the same late fœtal brain as Fig. 5.

Fig. 1

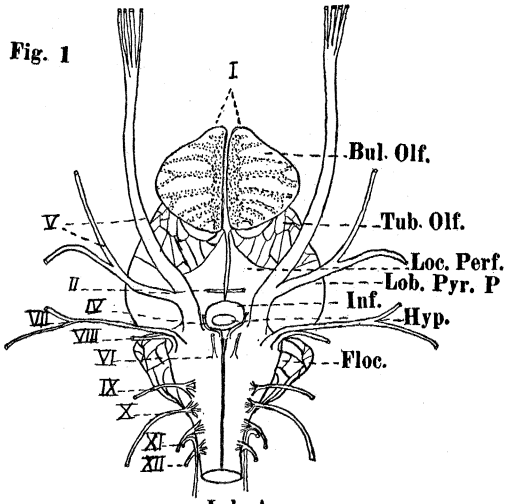


Fig. 6

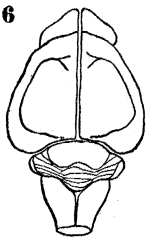


Fig. 5

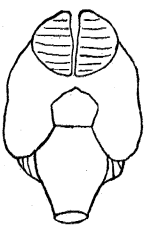


Fig. 2

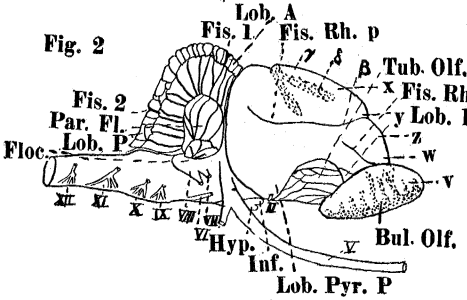


Fig. 3

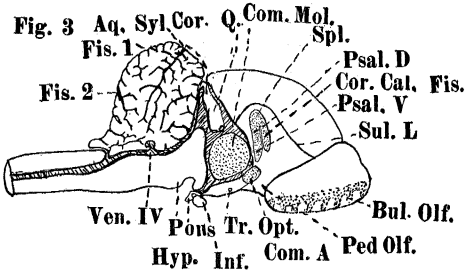


Fig. 4

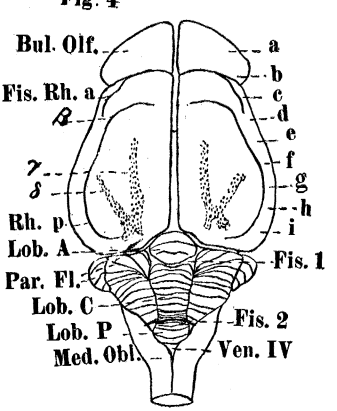


PLATE XXV.

FIGS. 7–11. Horizontal, longitudinal sections of the brain. The dotted parts of the figures show the ventricles.

FIG. 7. The dorsal surface of a horizontal section; taken in plane *v* of Fig. 2.

FIG. 8. The dorsal surface of a horizontal section, taken in the plane *w* of Fig. 2.

FIG. 9. The dorsal surface of a horizontal section, taken in the plane *z* of Fig. 2.

FIG. 10. The dorsal surface of a horizontal section, taken in the plane *y* of Fig. 2.

FIG. 11. The dorsal surface of a horizontal section, taken in plane *x* of Fig. 2.

FIGS. 12–20 are cross-sections of the brain, beginning at the anterior end.

FIG. 12. The caudal surface of a cross-section taken in the plane *a* of Fig. 4.

FIG. 13. The caudal surface of a cross-section taken in the plane *b* of Fig. 4.

FIG. 14. The caudal surface of a cross-section taken in the plane *c* of Fig. 4.

FIG. 15. The caudal surface of a cross-section taken in the plane *d* of Fig. 4.

FIG. 16. The caudal surface of a cross-section taken in the plane *e* of Fig. 4.

FIG. 17. The caudal surface of a cross-section taken in the plane *f* of Fig. 4.

FIG. 18. The caudal surface of a cross-section taken in the plane *g* of Fig. 4.

FIG. 19. The caudal surface of a cross-section taken in the plane *h* of Fig. 4.

FIG. 20. The caudal surface of a cross-section taken in the plane *i* of Fig. 4.

Fig. 7

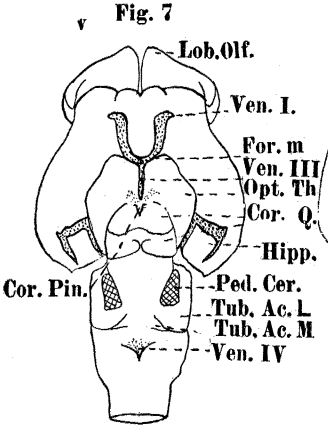


Fig. 8

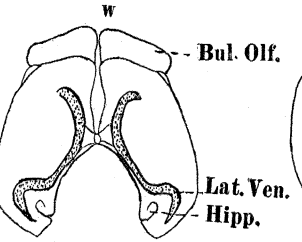


Fig. 9

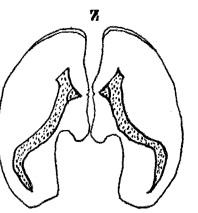


Fig. 10

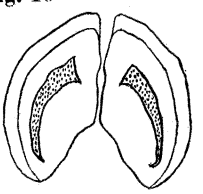


Fig. 11

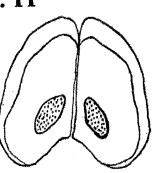


Fig. 12

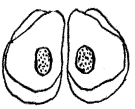


Fig. 13

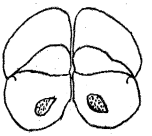


Fig. 14

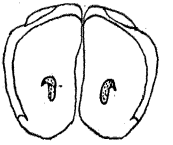


Fig. 15

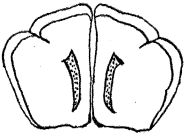


Fig. 16

Fig 17

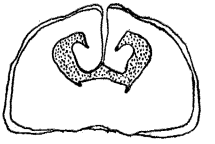


Fig. 18

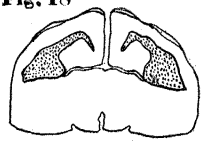


Fig. 19

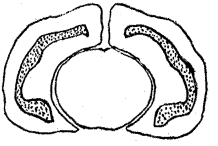


Fig. 20

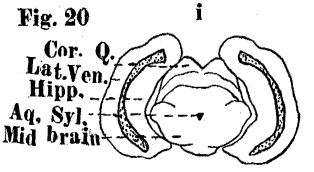
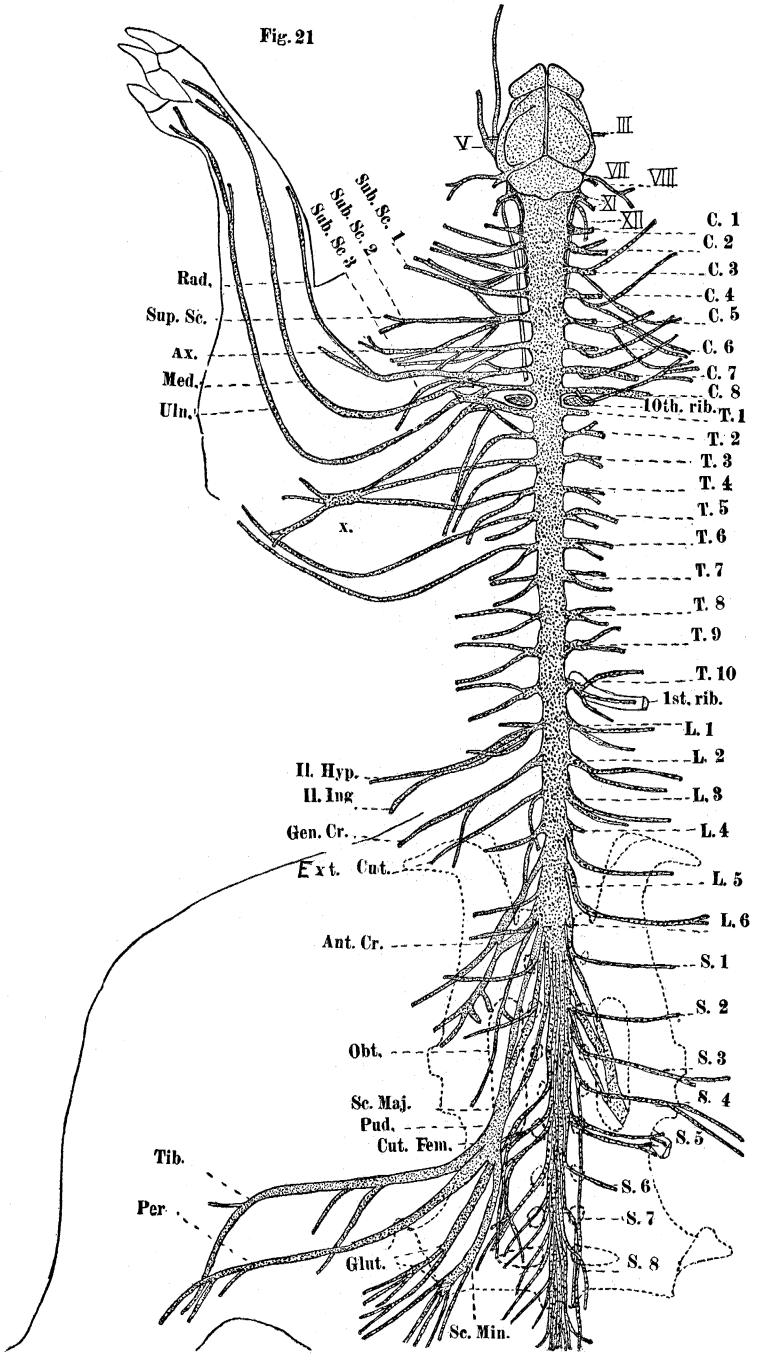


PLATE XXVI.

FIG. 21. A drawing of the entire central nervous system. The dotted lines show the outline of the sacrum in its natural relation to the spinal nerves. The nerves on the left hand side of the figure are all the ventral branches of the spinal nerves. On the right hand side of the figure, the more superficial branches of the spinal nerves are shown.

Fig. 21


V
III
VII
VIII
XI
XII
Sub. Sc. 1
Sub. Sc. 2
Sub. Sc. 3
Rad.
Sup. Sc.
Ax.
Med.
Uln.
X.
C. 1
C. 2
C. 3
C. 4
C. 5
C. 6
C. 7
C. 8
10th. rib.
T. 1
T. 2
T. 3
T. 4
T. 5
T. 6
T. 7
T. 8
T. 9
T. 10
1st. rib.
L. 1
L. 2
L. 3
L. 4
L. 5
L. 6
S. 1
S. 2
S. 3
S. 4
S. 5
S. 6
S. 7
S. 8
Il. Hyp.
Il. Ing.
Gen. Cr.
Ext. Cut.
Ant. Cr.
Obt.
Sc. Maj.
Pud.
Cut. Fem.
Tib.
Per.
Glut.
Sc. Min.